Curriculum Vitae

CELESTINE N. MERCER

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EDUCATION

University of Oregon, Eugene, Oregon 2003-2009
Ph.D. Igneous Petrology and Hydrothermal Systems, 2009
Advisors: A. Dana Johnston and Mark H. Reed

Oberlin College, Oberlin, Ohio 1998-2002
B.A. Physics/Magna Cum Laude in Geology, 2002
Advisors: Jonathan M. Castro and John H. Scofield

PROFESSIONAL EXPERIENCE

Research Geologist 2011-present
U.S. Geological Survey, Central Mineral and Environmental Resources Science Center, Denver, Colorado

Visiting Scientist 2011-present
Lunar and Planetary Institute, Houston, Texas

Postdoctoral Research Fellow 2010-2011
Lunar and Planetary Institute, Houston, Texas

Visiting Assistant Professor of Geology 2009-2010
Colorado College, Colorado Springs, Colorado

Graduate Teaching Fellow 2003-2009
University of Oregon, Eugene, Oregon

Substitute Teacher 2003
Montrose County School District Re-1J, Montrose, Colorado

Jet Propulsion Laboratory Intern 2001
Earth and Space Science Division, Pasadena, California

HONORS

- U.S. Geological Survey Performance Award 2014
- NASA Astronaut Candidate Semi-Finalist (top 2% of applicants) 2013
- U.S. Geological Survey Performance Award 2013
- U.S. Geological Survey Performance Award 2012
- Oberlin College John W. Heisman Athletics Hall of Fame Inductee 2012
- AbGradCon Stipend Recipient 2011
- Arizona State University SIMS Workshop Stipend Recipient 2011
- NSF/Microbeam Analysis Society EBSD 2008 Workshop Scholarship 2008
- Geological Society of America Lipman Research Award 2006
- University of Oregon Staples Research Fellowship 2004
- Sigma Xi Scientific Research Society Member 2002
- Oberlin Honda Scholar-Athlete Award 2002
- NCAA All American Division III Swimming and Diving Team 1999-2001

RESEARCH GRANTS

- U.S. Geological Survey, Mineral Resources Program: "Magmas to Metals: Melt Inclusion Insights into the Formation of Critical Element-Bearing Ore Deposits." Co-PI: Kathryn Watts (USGS Menlo Park). Salary and research operating expenses for Mercer, Watts, and team members, FY 2015-2017.

PUBLICATIONS

- **Mercer C.N.**, Hofstra A.H., Todorov T.I., Roberge J., Burgisser A., Adams D.T., and Cosca M.A. (In Press) Pre-eruptive conditions of the Hideaway Park topaz rhyolite: Insights into metal source and evolution of magma parental to the Henderson porphyry molybdenum deposit, Colorado. *Journal of Petrology*.
- **Mercer C.N.** (In Press) Germanium—Giving Microelectronics an Efficiency Boost. U.S. Geological Survey Mineral Commodity Fact Sheet.
- **Mercer C.N.** (In Press) Indium—Bringing Liquid-Crystal Displays into Focus. U.S. Geological Survey Mineral Commodity Fact Sheet.
- **Mercer C.N.**, Reed M.H., and Mercer C.M. (2015) Timescales of porphyry-Cu deposit formation: Insights from titanium diffusion in quartz. *Economic Geology*, 110(3), 587-602.
- Roberge J., Guilbaud M-N., **Mercer C.N.**, and Reyes-Luna P. (2014) Insight on monogenetic eruption processes at Pelagatos volcano, Sierra Chichinautzin, Mexico: A combined melt inclusion and physical volcanology study. In: Zellmer, G.F., Edmonds, M., and Straub, S.M. (eds.), The Role of Volatiles in the Genesis, Evolution and Eruption of Arc Magmas, Geological Society of London, London, Special Publications, 410, 20 pp.
- Gross J., Treiman A.H., and **Mercer C.N.** (2014) Lunar feldspathic meteorites: Constraints on the geology of the lunar highlands, and the origin of the lunar crust. *Earth and Planetary Science Letters*, 388, 318-328.
- **Mercer C.N.** and Reed M.H. (2013) Porphyry-Cu-Mo Stockwork Formation by Dynamic, Transient Hydrothermal Pulses: Mineralogic Insights From the Deposit at Butte, Montana. *Economic Geology*, 108, 1347-1377.
- **Mercer C.N.,** Treiman A.H., and Joy K.H. (2013) New lunar meteorite Northwest Africa 2996: A window into farside lithologies and petrogenesis. *Meteoritics and Planetary Science*, 48(2), 289-315.
- Hofstra A.H., Todorov T.I., **Mercer C.N.**, Adams D.T., and Marsh E.E. (2013) Silicate melt inclusion evidence for extreme pre-eruptive enrichment and post-eruptive depletion of Lithium in silicic volcanic rocks of the western United States—Implications for the origin of Lithium-rich brines. *Economic Geology*, 108, 169-1701.
- Kring D.A., Abramov O., Galenas M.G., Joy K.H., Kramer G.Y., **Mercer C.N.**, Nahm A.L., Niihara T., Ohman T., Rapp J.F., Shaner A.J., Simmons S., Weller M.B., and White O.L. (2011) Lunar Analogue Training at Meteor Crater, Arizona and the San Francisco Volcanic Field, Arizona, *Lunar and Planetary Institute Contribution Series*, 1618.
- **Mercer C.N.** (2009) Mineralogical indicators of magmatic and hydrothermal processes in continental arc crust. Dissertation thesis, University of Oregon, Eugene, Oregon, 177pp.
- **Mercer C.N.** and Johnston A.D. (2008) Experimental Studies of the P-T-H_2O Near-Liquidus Phase Relations of Basaltic Andesite From North Sister Volcano, High Oregon Cascades: Constraints on Lower-Crustal Mineral Assemblages. *Contributions to Mineralogy and Petrology*, 155(5), 571-592.
- Castro J.M. and **Mercer C.N.** (2004) Microlite textures and volatile contents of obsidian from the Inyo volcanic chain, California. *Geophysical Research Letters*, 31(L18605): doi: 10.1029/2004GL02489.

PUBLISHED ABSTRACTS

- **Mercer C.N.**, Watts K.E., Meighan C.J., and Bennett M.M. (2015) Mineral and melt inclusion constraints on the petrogenesis of regional magmas and magnetite ore from the Pea Ridge (IOA-REE) and Boss Bixby (IOCG) deposits, USA. *Society of Economic Geologists-CODES Conference*, Abstract.
- **Mercer C.N.**, Reed M.H., and Mercer C.M. (2014) Timescales of porphyry-Cu deposit formation: Insights from titanium diffusion in quartz. *Goldschmidt Conference*, Abstract 2786.

- Roberge J., Guilbaud M-N., **Mercer C.N.**, and Reyes-Luna P. (2014) Insight on monogenetic eruption processes at Pelagatos volcano, Sierra Chichinautzin, Mexico: A combined melt inclusion and physical volcanology study. *Goldschmidt Conference*, Abstract 2091.
- **Mercer C.**N., Hofstra A.H., Todorov T.I., Roberge J., Sisson T.W., Burgisser A., Adams D.T., and Cosca M.A. (2014) Pre-eruptive conditions of the Hideaway Park topaz rhyolite: Insights into metal source and evolution of magma parental to the Henderson porphyry molybdenum deposit. *Pan-American Current Research On Fluid Inclusions (PACROFI) XII Conference*, Abstract.
- Roberge J., **Mercer C.N.**, Kent A.J.R., Guilbaud M.-N., and Arrieta-Garcia G. (2014) Petrogenesis and metal budget of three volcanoes in the Chichinautizin monogenetic field, Mexico: A melt inclusion study. *Pan-American Current Research On Fluid Inclusions (PACROFI) XII Conference*, Abstract.
- **Mercer C.N.**, Roberge J, Todorov T.I., and Hofstra A.H. (2013) To homogenize, or not to homogenize, that is the question: Quartz-hosted melt inclusion analysis avenues. *American Geophysical Union Fall Meeting*, Abstract V33B-2743.
- Roberge J., **Mercer C.N.**, Kent A.J.R., and Guilbaud M.-N. (2013) Petrogenesis and metal budget of Pelagatos volcano in the Chichinautizin monogenetic field, Mexico: A melt inclusion study. *American Geophysical Union Fall Meeting*, Abstract V33B-2740.
- **Mercer C.N.**, Hofstra A.H., and Todorov T.I. (2013) Petrogenesis and metal budget of Eocene igneous rocks from magmatic systems concurrent with Carlin-type gold deposition in Nevada, USA: A melt inclusion study. *Society of Economic Geologists Conference*, Abstract P2.33.
- **Mercer C.N.**, Hofstra A.H., Todor T.I., and Marsh E.E. (2012) Pre-eruptive conditions of ore-forming magma that produced the Henderson molybdenite deposit, CO: Insights from melt inclusions and mineral thermobarometry. *Goldschmidt Conference*, Abstract 3151.
- **Mercer C.N.**, Hofstra A.H., Marsh E.E., Todor T.I., Koenig A.E. (2012) Tracking magmatic molybdenum concentrations during evolution and degassing of the Hideaway Park rhyolite, Colorado: Insights into Mo partitioning in Climax-type deposits. *Pan-American Current Research on Fluid Inclusions (PACROFI) XI*, Abstract.
- *Jacob S.R. and **Mercer C.N.** (2012) Tracking the process of volatile release from the lunar highland breccia meteorite Northwest Africa 2996 using vesicle size distributions. *43rd Lunar and Planetary Science Conference*, Abstract 1659.
- Gross J., Treiman A.H., and **Mercer C.N.** (2012) Sinking the Lunar Magma Ocean: Meteoritic Evidence and the Return of Serial Magmatism. *43rd Lunar and Planetary Science Conference*, Abstract 2306.
- **Mercer C.N.** and Reed M.H. (2011) Porphyry-Cu-Mo Stockwork Formation by Dynamic, Transient Hydrothermal Pulses: Mineralogic Insights From the Deposit at Butte, Montana. *Eos Trans. AGU*, 92(24), Abstract V13D-2635.
- **Mercer C.N.** and Treiman A.H. (2011) Energy produced from serpentinization of ultramafic rocks on terrestrial planets: Implications for sustaining microbial communities. *Astrobiology Graduate Conference*, Abstract.
- **Mercer C.N.** and Treiman A.H. (2011) New Lunar Meteorite NWA 2996: A Window into Highland Plutonic Processes and KREEP Metasomatism. *42nd Lunar and Planetary Science Conference*, Abstract 2111.
- **Mercer C.N.** and Reed M.H. (2009) The Temperature Connection Between Magmatic and Hydrothermal Realms of the Porphyry-Cu-Mo Deposit at Butte, Montana, *2009 Portland Geological Society of America Annual Meeting*, Abstract 204-2.
- **Mercer C.N.** and Reed M.H. (2008) Quartz Crystal Connections Between Magmatic, Plutonic, and Hydrothermal Environments, *Geochimica et Cosmochimica Acta,* 72(12), Suppl. 1, Abstract 10a-144.
- **Mercer C.N.** and Reed M.H. (2007) Insights Into the Formation of Deep Hydrothermal Quartz From the Porphyry-Copper-Molybdenum Deposit at Butte, Montana, *Eos Trans. AGU,* Fall Meet. Suppl., Abstract V24-3140.
- **Mercer C.N.** and Johnston A.D. (2007) Experimental Studies of the P-T-H_2O Near-Liquidus Phase Relations of Basaltic Andesite From North Sister Volcano, High Oregon Cascades: Constraints on Lower-Crustal Mineral Assemblages, *Eos Trans. AGU,* 88(23), Jt. Assem. Suppl., Abstract V34A-08.

- **Mercer C.N.** and Reed M.H. (2007) Water content of Ore Forming Magma From the Porphyry-Copper-Molybdenum Deposit at Butte, Montana, USA, *Eos Trans. AGU,* 88(23), Jt. Assem. Suppl., Abstract V23B-07.
- **Mercer C.N.** and Johnston A.D. (2005) Experimental Studies of the P-T-H2O Near-Liquidus Phase Relations of Basaltic Andesite From North Sister Volcano, Central Oregon Cascades: Constraints on Mid- to Lower-Crustal Mineral Assemblages, *Eos Trans. AGU, 86(52),* Fall Meet. Suppl., Abstract V51D-1525.
- Castro J.M., **Mercer C.N.**, and Cashman K.V. (2002) Textural characterization of microlites in rhyolitic obsidian: Implications for crystallization, eruptive time scales, and degassing in the Inyo Volcanic Chain, CA. *3rd Biennial workshop on Subduction Processes Emphasizing the Kurile-Kamchatka-Aleutian Arcs*, Abstract.
- Bridges N.T. and **Mercer C.N.** (2002) Tectonic and volcanic history of the Nepthys Mons Quadrangle (V54), Venus. *33rd Lunar and Planetary Science Conference*, Abstract 1914.
- Bridges, N.T., Titus T.N., Herkenhoff K.E., Kieffer H.H., Hecht M.H., and **Mercer C.N.** (2001) Seasonal dark spots in Martian gullies and other terrains studied by TES and other data sets, *TES Data Users' Workshop*, Arizona State University, Abstract.

** Denotes student author*

PRESENTATIONS

- U.S. Geological Survey GMEG Seminar, Menlo Park, California (invited talk) 2015
- Goldschmidt Conference, Sacramento, California, (talk) 2014
- Pan-American Current Research on Fluid Inclusions, Pingree Park, Colorado (talk) 2014
- American Geophysical Union Fall Meeting, San Francisco, California (poster) 2013
- Society of Economic Geologists Conference, Whistler, British Columbia (poster) 2013
- American Museum of Natural History, New York, New York (invited talk) 2013
- Goldschmidt Conference, Montreal, Canada (talk) 2012
- Pan-American Current Research on Fluid Inclusions, Windsor, Canada (poster) 2012
- American Geophysical Union Fall Meeting, San Francisco, California (poster) 2011
- Astrobiology Graduate Conference, Bozeman, Montana (poster) 2011
- Lunar and Planetary Institute Lunar Analogue Training at Meteor Crater, Arizona (talk) 2011
- Lunar and Planetary Science Conference, The Woodlands, Texas (talk) 2011
- NASA Lunar Science Institute Center for Lunar Science and Exploration Team Meeting, Houston, Texas (talk) 2010
- Lunar and Planetary Institute, Houston, Texas (invited talk) 2010
- Univ. of New Mexico Institute of Meteoritics, Albuquerque, New Mexico (invited talk) 2010
- Geological Society of America Annual Meeting, Portland, Oregon (talk) 2009
- Colorado College, Colorado Springs, Colorado (invited talk) 2008
- Goldschmidt Conference, Vancouver, British Columbia (poster) 2008
- Oregon Nanoscience and Microtechnologies Institute Research Center Grand Opening, Eugene, Oregon (invited poster) 2008
- American Geophysical Union Joint Assembly, Acapulco, Mexico (talk and poster) 2007
- American Geophysical Union Fall Meeting, San Francisco, California (poster) 2007
- American Geophysical Union Fall Meeting, San Francisco, California (poster) 2005

PROFESSIONAL ACTIVITIES

American Mineralogist Special Section Associate Editor 2014-present

- Co-organizing a Special Section for the American Mineralogists's Centennial Volume (2015-2016) entitled "From Magmas to Ore Deposits"

American Geophysical Union Fall Meeting, San Francisco, California 2013

- Co-convened a session entitled "From Magmas to Ore Deposits: Tracking the Transition"

NASA Astrobiology Institute 2011

- Served on NASA Astrobiology: Exobiology & Evolutionary Biology proposal review panel

Lunar and Planetary Science Conference, The Woodlands, Texas 2011

- Judge for Dwornik Awards, recognizing outstanding undergraduate and graduate student planetary science research presentations, at the 42nd Lunar and Planetary Science Conference

Midstates Consortium for Math and Science 2009

- Participated in New Faculty Workshop—Strategic Planning for Early Career Success

TEACHING EXPERIENCE

U.S. Geological Survey, Denver, Colorado 2014-present

- Research Geologist: Mentoring students from the National Association of Geoscience Teachers-USGS Intern program, Denver Mayor's Program, and USGS Pathways Program

Lunar and Planetary Institute, Houston, Texas 2010-2012

- Postdoctoral Fellow: Advised LPI summer undergraduate research intern; project resulted in a student presentation at the 43rd Lunar and Planetary Science Conference (2012)

Colorado College, Colorado Springs, Colorado 2009-2010

- Visiting Assistant Professor of Geology: Developed course curriculum for introductory Physical Geology, Planetary Geology, Igneous/Metamorphic/Sedimentary Petrology, and Magmatic-Hydrothermal Ore Deposits; instructed hands-on laboratory exercises and field based projects in Colorado and New Mexico

University of Oregon, Eugene, Oregon 2004-2009

- Mineralogy Instructor (2008): Developed course curriculum for theoretical and applied mineralogy, including crystallography, systematic mineralogy, mineralization environments, optical and micro-analytical mineralogy
- Teaching Assistant/Laboratory Mentor: Instructed laboratory exercises, aided in logistics and teaching of two week summer field course in central OR; advised peers and undergraduate students in experimental petrology, electron microprobe/SEM, sample preparation, and fluid inclusion research laboratories

Montrose County School District Re-1J, Montrose, Colorado 2003

- Substitute Teacher: Taught math, science, music, Spanish, and physical education at the primary and secondary levels, including ESL students and special needs students

EDUCATION AND PUBLIC OUTREACH

- Science Fair judge for Devinny Elementary School, Lakewood, Colorado 2013
- Planetary Geoscientist Career Day presentation for 5th-6th graders at Hill Intermediate School, Houston, Texas 2010
- Designed and taught a hands-on science workshop for Rice University's Annual Sally Ride Science Festival for girls grades 5-8 2010
- Composed an autobiography, "Cosmic Rocks and Astronauts", for the *Young People Site of the Mineralogical Association of Canada* webpage, at the request of the Mineralogical Association of Cananda (http://www.mineralogicalassociation.ca/young/mineralogist.php) 2004
- Helped improve University of Oregon undergraduate geology collaborative study lounge 2004
- Special hands-on presentation for Eugene Boy Scout Troop Geology Merit Badge 2003

ANALYTICAL LABORATORY EXPERIENCE

- JEOL 8900 Superprobe, CAMECA SX100, and CAMECA SX50 electron microprobes used for major and minor element analyses of minerals and glasses
- FEI Quanta 450 Field Emission and JEOL 5800LV scanning electron microscopes used for high resolution textural characterization of rocks, minerals, and glasses
- 193 nm ArF excimer laser and Thermo XSERIES II quadrapole mass spectrometer (LA-ICP-MS) used for trace element analyses of minerals and glasses
- Thermo Nicolet Nexus 670 and Bruker Hyperion 3000 fourier transform infrared (FTIR) spectrometers used for quantifying dissolved H_2O/OH and CO_2/CO_3 in glasses
- Linkam Ultra High Temperature TS1400XY heating stage used for observing homogenization of silicate melt inclusions

- Experimental petrology apparatuses including piston-cylinders, 1-atmosphere gas-mixing furnaces, rapid-quench cold-seal TZM apparatuses, and carbon-arc welder
- CAMECA IMS 3f secondary ion mass spectrometer (SIMS) used for trace element analysis of natural and experimental glasses
- Petrographic microscopes for transmitted and reflected light rock and mineral characterization

FIELD EXPERIENCE

- Co-led pre-conference field trip for the *Pan-American Current Research On Fluid Inclusions (PACROFI) XII Conference* (2014); field trip included stops within the Colorado Mineral Belt and an underground mine tour of the Henderson porphyry molybdenum deposit
- Field work and sample collection throughout the Carlin-type gold trends in Nevada (2013) to support research on the petrogenesis and metal budget of Eocene igneous rocks near Carlin-type ore deposits. Trip included several open-pit mine tours
- Field work and sample collection at the Hideaway Park tuff and Henderson porphyry molybdenum deposit in Colorado (2012-2013) to support research on the metal source and evolution of magma parental to Climax-type molybdenum deposits.
- Participated in field trip to Barringer Crater, Arizona, led by Dr. David Kring (2011); produced maps and gave a field presentation comparing features of the Apollo 16 landing site to Barringer Crater, AZ to help field trip participants gain a sense of landform scales at the different sites; the maps I contributed were used for the 2011 astronaut training at Barringer Crater
- Field work and sample collection at the Josephine Ophiolite, California (2010) to support research on terrestrial and Martian serpentinization processes as a potential energy source for microbial communities
- Led day- to week-long Colorado College undergraduate geology field trips throughout Colorado and New Mexico (2009-2010), including an open-pit mine tour at the Cripple Creek gold mine, Colorado
- Anaconda Method Field Mapping of Ore Deposits Course, Yerington, Nevada (2006)
- Field work in volcanic/hydrothermal landscapes, including four seasons in the Oregon Cascades, an open-pit mining field trip in Butte, Montana, and a field trip to Costa Rica (2004-2008)
- Geology Field Course at Fort Lewis College, Durango, Colorado (2003), observing geologic features in Colorado, Wyoming, Idaho, and Utah

PEER REVIEWS

- Astrobiology
- Contributions to Mineralogy and Petrology
- Economic Geology
- Geological Association of Canada
- Geostandards and Geoanalytical Research
- Journal of Petrology
- Mineralogical Association of Canada
- National Science Foundation
- Ore Geology Reviews
- U.S. Geological Survey

PROFESSIONAL MEMBERSHIPS

- American Geophysical Union
- Earth Science Women's Network
- Geological Society of America
- Meteoritical Society
- Society of Economic Geologists